



1878, 17th DECEMBER. N° 4151.

SPECIFICATION

OF

ALFRED VINCENT NEWTON.

MACHINE APPARATUS FOR TREATING
OF THE LUNGS AND HEART.

LONDON:

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AND AT THE GREAT SEAL PATENT OFFICE,

BY, FREDERICKSON BUILDINGS, GOLDEN.

1874.



A.D. 1873, 17th DECEMBER. N° 4151.

**Pneumatic Apparatus for Treating Diseases of the
Lungs and Heart.**

LETTERS PATENT to Alfred Vincent Newton, of the Office for Patents, 66, Chancery Lane, in the County of Middlesex, Mechanical Draughtsman, for the Invention of "IMPROVED PNEUMATIC APPARATUS FOR TREATING CERTAIN DISEASES OF THE LUNGS AND HEART."—A communication from abroad by Professor Louis Waldenburg, of Berlin, in the Kingdom of Prussia.

Sealed the 29th May 1874, and dated the 17th December 1873.

PROVISIONAL SPECIFICATION left by the said Alfred Vincent Newton at the Office of the Commissioners of Patents, with his Petition, on the 17th December 1873.

I, ALFRED VINCENT NEWTON, of the Office for Patents, 66, Chancery Lane, in the County of Middlesex, Mechanical Draughtsman, do hereby declare the nature of the said Invention for "IMPROVED PNEUMATIC APPARATUS FOR TREATING CERTAIN DISEASES OF THE LUNGS AND HEART," to be as follows:—

The object of this Invention is to provide a facile means of obtaining
10 compressed and attenuated air for breathing into or for taking into the

Newton's Pneumatic Apparatus for Treating Diseases of the Lungs, &c.

lungs with the view of strengthening the lungs or of acting upon the right or left ventricle of the heart.

The apparatus in some respects resembles a miniature gasometer, that is to say, it consists of a stationary cylinder open at top, within which slides telescopically an inverted cylinder of somewhat smaller dimensions. 5 The inner cylinder is supported by weighted cords which pass over pulleys carried by standards which are attached to the outer cylinder. This cylinder is graduated, and by the side of the graduations is placed an open glass tube which communicates with the bottom of the cylinder. This is for the purpose of shewing the level at which water supplied to 10 the cylinder stands. A tap is also provided for running off the water. The inner cylinder is likewise graduated, but from the top downwards, and on the top of this cylinder is a mercury gauge communicating with the interior thereof for the purpose of shewing the degree of attenuation or compression, as the case may be, of the air contained therein. Con- 15 nected also with this vessel is a flexible pipe fitted at its extremity with a cup-shaped piece for receiving the face of the patient intended to be treated by the apparatus. An elastic padding surrounds the lip of this cup to permit of its being fitted air-tight to the face of the patient. A T way cock is applied to the flexible pipe for the purpose of bringing 20 the mouth of the patient into communication with the interior of the suspended cylinder or of the external atmosphere, as may be required.

In using this apparatus the outer cylinder is first filled with water to about the height of 80 centimeters. Weights are then hung to the suspending cords of the inner cylinder, and the T way cock being 25 closed the inner cylinder will be drawn up, and will thereby attenuate the air therein to an extent corresponding to the weight applied to the suspending cords.

If compressed air is required the inner cylinder is raised while the T way cock is open, and in proportion as the raised vessel is weighted 30 so will the air contained therein be compressed. The apparatus will therefore allow of the employment of air compressed or rarefied to a certain definite or ascertained degree.

Newton's Pneumatic Apparatus for Treating Diseases of the Lungs, &c.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Alfred Vincent Newton in the Great Seal Patent Office on the 17th June 1874.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, ALFRED VINCENT NEWTON, of the Office for Patents, 66, Chancery Lane, in the County of Middlesex, Mechanical Draughtsman, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Seventeenth day of December, in the year of our Lord One thousand eight hundred and seventy-three, in the thirty-seventh year of Her reign, did, for Herself, Her heirs and successors give and grant unto me, the said Alfred Vincent Newton, Her special licence that I, the said Alfred Vincent Newton, my executors, administrators, and assigns, or such others as I, the said Alfred Vincent Newton, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "**IMPROVED PNEUMATIC APPARATUS FOR TREATING CERTAIN DISEASES OF THE LUNGS AND HEART**," being a communication to me from abroad by Professor Louis Waldenburg, of Berlin, in the Kingdom of Prussia, upon the condition (amongst others) that I, the said Alfred Vincent Newton, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said Alfred Vincent Newton, do hereby declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, reference being had to the Drawing hereunto annexed and to the letters and figures marked thereon (that is to say) :—

The object of this Invention is to provide a facile means of obtaining either compressed or attenuated air, as may be required, for breathing

Newton's Pneumatic Apparatus for Treating Diseases of the Lungs, &c.

into or for taking up into the lungs with the view of strengthening the lungs or of acting upon the right or left venticle of the heart.

The apparatus in some respects resembles a miniature gasometer, that is to say, it consists of a stationary cylinder open at top, within which slides telescopically an inverted cylinder of somewhat smaller 5 dimensions. The inner cylinder is supported by weighted cords which pass over pulleys carried by standards attached to the outer cylinder. This cylinder is graduated, and by the side of the gradations is placed an open glass tube which communicates with the bottom of the cylinder. This is for the purpose of shewing the level at which water supplied to 10 the cylinder stands. The inner cylinder is likewise graduated, and it is fitted at top with a mercury gauge for showing the degree of attenuation or compression (as the case may be) of the air contained in the cylinder. Connected also with this vessel is a flexible pipe terminating in a cup-shaped piece for fitting air-tight to the face of the patient. A T way 15 cock is applied to the flexible pipe for the purpose of bringing the mouth of the patient into communication with the interior of the suspended cylinder or of the external atmosphere, as may be required.

In the accompanying Drawing Fig. 1 shows in perspective elevation the improved pneumatic apparatus; Fig. 2 is a sectional plan taken 20 about the line 1, 2, of Fig. 1.

Fig. 3 is a front view on an enlarged scale of the cup-shaped termination of the flexible pipe; and Figures 4 and 5 shew the same in cross section as attached to a tap with which the flexible pipe is fitted.

a, a, Fig. 1, is a cylindrical-shaped vessel open at top, say one metre 25 in height and thirty centimetres in diameter, in which works the cylinder *b, b*, open at bottom, but closed at top, and of the same height as the cylinder *a*, but somewhat less, say twenty-seven centimetres in diameter. These vessels are made by preference of sheet zinc lacquered on their outside surfaces. 30

On the upper portion of the outer periphery of the cylinder *a* are three sockets *c, c, c*, equidistant from each other and provided to receive three iron rods *d, d, d*, which project about one metre above the upper rim of the cylinder *a*. These rods are connected together at their upper part by means of a clamping ring *e, e*, and carry each at their upper 35 extremity a wooden roller *f, f*. Over these rollers run cords *g, g, g*, which are fastened at their inner ends to the cover of the cylinder *b*,

Newton's Pneumatic Apparatus for Treating Diseases of the Lungs, &c.

and are provided at their outer free ends with hooks *h*, *h*, for hanging on weights *i*, *i*. The cylinder *a* has at its lower part a tap *k* for letting off water. It has also at its lower rim an opening *l*, in which a glass tube *m* is cemented. This tube runs up the whole length of the
5 cylinder, and on it can be read the height of the water contained therein.

At the side of the glass tube on the outer cylinder is a scale of centimètres. The cylinder *b* has also a scale of centimetres beginning from above. In its cover are two openings, the one *n* communicates
10 through a flexible tube *o* with a cup-shaped piece *p*; in the other *q* a mercury gauge *r* with millimetre divisions is adjusted air-tight. This gauge is provided on its inner side with a metal protecting piece *s*, *s*. The cylinder *b* is fitted at its opposite sides with V shaped ribs *t*, *t*, (see also Fig. 2) which work in vertical grooves *u*, *u*, on the inner periphery
15 of the cylinder *a*. This arrangement is intended to steady the vertical motions of the inner cylinder. The metal cup *p* (see Fig. 3) is provided with a covering of rubber on its edges, and it thus forms a mask to fit the face of the patient.

Masks in any desired number and size may be provided with the
20 apparatus to suit varying circumstances. *v* is a tube shaped to fit air-tight on the end of a tap *w*, to the other end of which the flexible pipe *o* is adjusted. The plug of this tap is bored out in \perp form (see Figures 4 and 5), so that according to the position of the same a communication between the mask and the inner cylinder (Fig. 4) or
25 between the mask and the outer atmosphere (Fig. 5) through the opening *x* will take place.

The manner of working the improved pneumatic apparatus is as follows:—The cylinder *a* is first filled with water to a height of about twenty centimetres from the top. If weights *i* are now hung on the
30 hooks *h* the cylinder *b* will if the tap *w* is closed be drawn up to a certain height and the air in the same will be attenuated to a certain degree, which can be ascertained with exactitude. The pressure of one atmosphere on the cylinder *b* may be reckoned as one thousand one hundred and eighty-three pounds exactly. If the friction is taken into account
35 the pressure of one atmosphere on the inner cylinder may be set down at about one thousand two hundred pounds. If for example thirty pounds be applied the weight of the cylinder *b*, which is about ten pounds, must

Newton's Pneumatic Apparatus for Treating Diseases of the Lungs, &c.

be deducted and a working power of only twenty pounds is the result, which corresponds with an air rarefaction of $\frac{20}{1200} = \frac{1}{60}$ of an atmosphere. The mercury gauge *r* shows that this computation is perfectly correct as an air rarefaction of about twelve millimetres quicksilver will be indicated. In this manner it is possible to attain any desired degree 5 of air rarefaction. If the tap *w* be now opened air from the outer atmosphere is drawn in and the cylinder continues to rise until either the tap is closed or the cylinder itself rises out of the water.

In order that the cylinder *b* may not be forcibly jerked out of position stops *y, y*, are screwed to the rods, say at a height of sixty-six centi- 10 metres. If after the cylinder is drawn up to the highest limit the weights are taken off the hooks the cylinder will sink down from its own weight of ten pounds and the air in the cylinder will be compressed to the extent of $\frac{10}{1200} = \frac{1}{120}$ atmospheric pressure. If now more weight be placed on the cylinder, for example ten pounds, the result will be an 15 air compression of twenty pounds, $= \frac{1}{60}$ atmospheric pressure. The mercury gauge again shews exactly the degree of compression, which corresponds with the theoretical calculation. If the tap *w* be opened whilst the air is compressed the cylinder will sink down, the degree of compression however will remain always the same, and the compressed 20 air will stream under an equable pressure out of the mask. The apparatus therefore provides for the employment of both compressed and rarefied air of a certain definite and ascertainable degree.

With reference to the curative use of the Invention it may be remarked that the apparatus serves especially for the medical treatment 25 of lung and heart diseases, and to this end it can be employed in various ways.

(a) for causing compressed air to be inhaled.

(b) for breathing into compressed air.

(c) for inhaling rarefied air.

(d) for breathing into rarefied air.

The method (a) has the effect, amongst others, of expanding the lungs and the chest, and is efficacious in cases of consumption and narrow

Newton's Pneumatic Apparatus for Treating Diseases of the Lungs, &c.

5 chests as well as in other diseases in which the lungs are not sufficiently expanded. The method (*d*) on the contrary is efficacious when the lungs are too much expanded, as for instance in what is called emphysem. The method (*a*) is also efficacious in affections of the left lobe of the heart, namely, in stenose or insufficiency in the beating of the same, whilst the method (*c*) may be used in similar affections of the right lobe of the heart.

The method (*b*) may be employed in many cases where the hearing is affected.

10 In a medical journal (Berlin Clinical Weekly Journal) for One thousand eight hundred and seventy-three, Nos. 39, 40, 46, and 47, this subject will be found to have been treated thoroughly and scientifically by the Inventor.

15 Having now set forth the nature of the Invention of "Improved Pneumatic Apparatus for Treating certain Diseases of the Lungs and Heart," as communicated to me by my foreign correspondent and explained the manner of carrying the same into effect I wish it to be understood that under the above in part recited Letters Patent I claim, the means above described for providing either compressed or attenuated
20 air, as may be desired, for the use of patients suffering from diseases of the lungs or heart.

In witness whereof, I, the said Alfred Vincent Newton, have here-
unto set my hand and seal, the Seventeenth day of June, in
the year of our Lord One thousand eight hundred and seventy-
25 four.

A. V. NEWTON. (L.S.)

LONDON:

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Printers to the Queen's most Excellent Majesty. 1874.

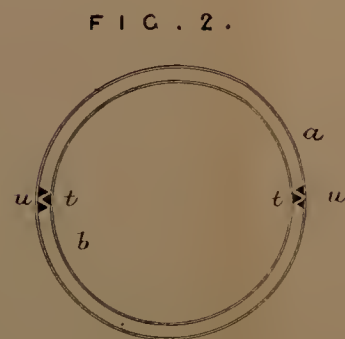
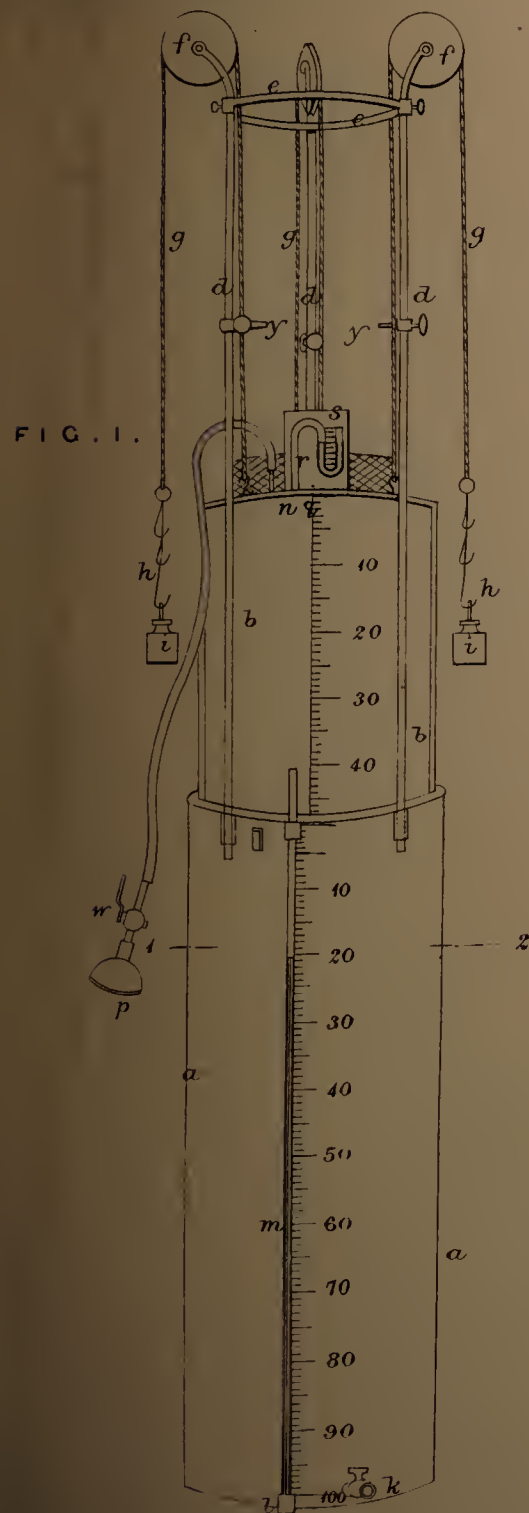


FIG. 3.

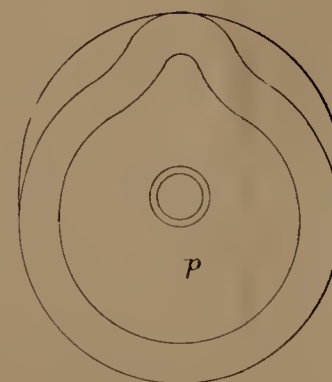


FIG. 4.

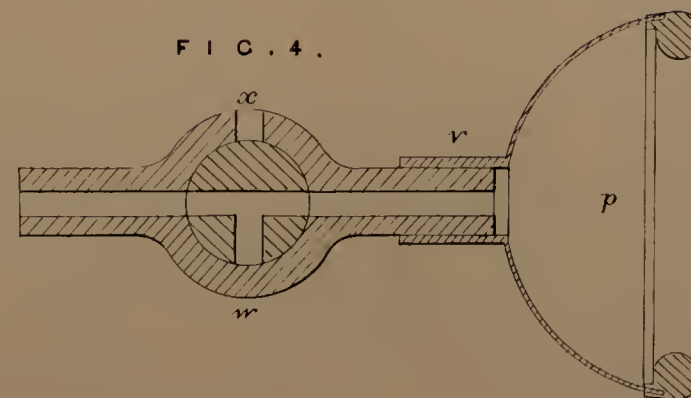
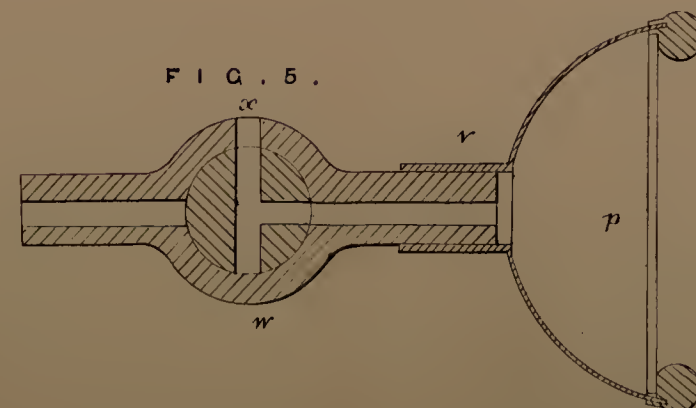


FIG. 5.



The filed drawing is not colored.

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